BSPR:
The invention is an improvement on the Bayer process for producing alumina from bauxite of the type wherein the bauxite is added to a caustic solution to produce a slurry containing soluble sodium aluminate and an insoluble red mud fraction which is then subjected to one or more separation steps to produce a thickener overflow which is then subjected to sand filtration to polish the thickener overflow, the improvement which comprises treating the thickener overflow with a filtration improving amount of a biopolymer. The filtration improvement is improved solids removal efficiency.

BSPR:
The improvement of the invention may be used in conjunction with a number of conventional flocculants which are normally used to separate soluble sodium aluminate from the insoluble red mud fraction in the settlers of the Bayer process. In the preferred embodiment these flocculants may be selected from the group consisting of poly(sodium acrylate), poly(ammonium acrylate), poly(acrylamide), copolymers of sodium or ammonium acrylate and acrylamide, copolymers of sodium or ammonium acrylate and acrylamide containing pendant hydroxamic acid groups, starch and dextran.

BSPR:
The biopolymer of the invention should be water soluble and will generally have a molecular weight of at least 50,000 although values in the range 500,000 up to 10 million is preferred. The biopolymer preferably is a microbially produced polysaccharide and has a preponderance of glucose units joined together through 1:6 glucoside linkages. Suitable materials are described in U.S. Pat. No. 3,085,853. Dextran derivatives, such as the polyphosphates described in GBA-1154993 or dextran sulphates mentioned in

CA-A-825234, can also be used. Further, in alternative embodiments of the invention, polysaccharides including pullulan, zooglan, lactan, alginates, starch and mixtures thereof may be used. The biopolymer can be supplied in the form of dry particulate solid. The biopolymer of the invention is usually dissolved in water or alkaline plant liquor before addition to the thickener overflow in the process of the invention.

CLPR:
1. An improvement in the Bayer process for producing alumina from bauxite of the type wherein the bauxite is added to a caustic solution to produce a slurry of sodium aluminate solution and an insoluble red mud fraction which is then subjected to a thickener and separation steps to produce a thickener overflow, wherein said thickener overflow results from solid liquid separation, wherein said thickener overflow is then subjected to sand filtration to polish the thickener overflow the improvement comprising adding to the thickener overflow being fed to said sand filtration from 0.05 to 15 mg/l of a water-soluble polysaccharide, wherein no inorganic filter aid is added to said thickener overflow being fed to said sand filtration.

CLPR:
2. The process of claim 1 further comprising the step of adding a flocculant to the slurry to separate the red mud fraction from the aluminate solution wherein the flocculant is selected from the group consisting of poly(sodium acrylate), poly(ammonium acrylate), poly(acrylamide), copolymers of sodium or ammonium acrylate and acrylamide, and copolymers of sodium or ammonium acrylate and acrylamide containing pendant hydroxamic acid groups.

CLPR:

4. The process of claim 1, wherein the water-soluble polysaccharide is
selected from the group consisting of dextran, pullulan, alginate, zooglan,
lactan, starch and mixtures thereof.

DOCUMENT-IDENTIFIER: US 5716530 A
TITLE: Biopolymer use as a sand filter aid

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ABPL:
In the Bayer process for producing alumina from bauxite of the type wherein the bauxite is added to a caustic solution to produce a soluble aluminate solution and an insoluble red mud fraction which is then subjected to one or more separation steps to produce a thickener overflow which is then subjected to a Sand Filter to polish the thickener overflow the improvement which comprises treating the thickener overflow with a solids removal efficiency improving amount of a biopolymer.

BSPR:
The resulting slurry of sodium aluminate solution and insoluble red mud from the digesters is cooled through a series of flash tanks in order to reduce the pressure and bring the temperature of the liquor down to the atmospheric boiling point. The coarser size fraction is generally removed as underflow by using either gravity separators or wet cyclones. The overflow slurry contains the finer size fraction and normally reports to a thickener where a solid-liquid separation step takes place. The suspended solids level in the overflow liquor from these thickeners generally contains 50-300 mg/l of suspended solids. This far exceeds the <10 mg/l level necessary to achieve the required product quality with regard to iron impurity. Therefore, this settler overflow liquor is further clarified by batch filtration, specifically pressure filter presses or hydrostatic head gravity sand filters.

additionally the liquor
may be the pregnant liquor treated before passing through the Kelly filter to
clarify before precipitation of alumina trihydrate. The flocculants may also
be used in the separation of precipitated alumina
trihydrate.

BSPR:
The invention is of particular benefit in the settlement and washing of red
mud. In such processes the flocculant polymers used down the washing train may
differ from one another, for instance by having gradually decreasing ionicity.

BSPR:
The polymer may be used in conjunction with other natural or synthetic
flocculant polymers known to be useful for the treatment of red mud-containing
liquors. For instance the flocculant polymers may be used in conjunction with
dextran as described in our copending application
EP-A-0367437 or with starch
based flocculants. The flocculant polymer may be used in conjunction with
other chemical additives, for instance, with lime as described in our copending
application EP-A-0352030.

DEPR:
In all of the following examples slurries of Bayer process liquors are made up
from the individual components so as to simulate the liquor at various stages
of the red mud circuit. The slurry, once made up, is treated with the
flocculant polymer under test at the stated dose level, by a process in which
the rate of settlement of solids from the liquor is determined by following the
rate at which the level of the solids drops in a measuring cylinder, the volume
of the underflow solids settled out after the process is recorded, and the
clarity of the supernatant is determined in a "wedge" test.
In this last test,

the supernatant liquor is placed into a vessel which has a wedge shape, with
the point of the wedge facing downwards. The rear face of the transparent
container is marked with a series of graduations from 0 to 46, the highest of
which is at the top of the wedge. The number recorded for the wedge test is
the highest number which can be seen clearly through the solution in the
container.

DEPR:
A red mud slurry was formed having a composition such as to simulate that of a
primary thickener feed. Such a slurry is formed of 30 g/l red mud solids in a
liquor containing 200 g/l NaOH and 50 g/l Na.sub.2 CO.sub.3 and maintained at
90.degree. C. High molecular weight water soluble anionic flocculants, as
listed below, were added at 1, 2 & 3 mg/l. The settlement rate of solids was
recorded in centimeters per minute. The volume of the settled underflow was
recorded after 10 minutes settlement and the clarity of the supernatant was
recorded after 10 minutes settlement.

DEPR:
A red mud slurry was formed having a composition such as to simulate that of a
typical 1st Washer. Such a slurry is formed of 30 g/l red mud solids in a
liquor containing 96 g/l NaOH and 24 g/l Na.sub.2 CO.sub.3 and maintained at
80.degree. C. High molecular weight water soluble anionic flocculants, as in
Example 1, were added at 1, 2 & 3 mg/l.

DEPR:
A red mud slurry was formed having a composition such as to simulate that of a
typical 2nd Washer. Such slurry is formed of 40 g/l red mud solids in a liquor
containing 6 g/l NaOH and 14 g/l Na.sub.2 CO.sub.3. High molecular weight
water soluble anionic flocculants, as in Example 3 were

added at 3, 4 & 5 mg/l.

DEPR:
A red mud slurry was formed having a composition such as to simulate that of a
5th.fwdarw.Final Washer Feed. Such a slurry is formed of 50 g/l red mud solids
in a liquor containing 25 g/l NaOH. High molecular weight, water soluble
anionic flocculants as listed below were added at 1, 2 & 3 mg/l. The remaining
procedure was as in Example 1.

DEPR:
A slurry made to stimulate the red mud washers of a Bayer plant was prepared
using the following ratios of ingredients taken from an operational plant:

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